# Biscayne Bay
# Minimum Flows and Levels

## *Introduction*

**South Florida Water Management District**
**2003 Minimum Flows and Levels Priority List**
**and Schedule for Establishment**
**12/16/03**

| Region | Priority Water Bodies | Year Established |
|---|---|---|
| Lower East Coast | Surface Water: | |
| | Biscayne Bay -- South | 2004 |
| | Biscayne Bay -- North and Central | 2005 |
| | Biscayne Bay -- Manatee Bay, Barnes and Card Sound | 2005 |
| | Florida Bay | 2005 |
| | Loxahatchee River Tributaries | 2007 |
| | Lake Okeechobee**** | 2005 |
| | Ground Waters: | |
| | Southern Coastal Biscayne Aquifer | 2004 |
| Lower West Coast | Surface Waters: | |
| | Estero Ba | 2006 |
| | Ground Waters: | |
| | Water Table Aquifer | 2006 |
| Kissimmee Basin | Surface Waters: | |
| | Lake Istokpoga (Highlands County) | 2005 |
| | Kissimmee River | 2006 |
| | Lake Kissimmee (Osceola County) | 2006 |
| | Cypress Lake (Osceola County) | 2006 |
| | Lake Hatchineha (Osceola County) | 2006 |
| | Lake Tohopekaliga/Shingle Creek (Osceola County) | 2006 |
| | East Lake Tohopekaliga/Boggy Creek (Osceola County)* | 2006 |
| | Alligator Lake (Osceola County) | 2006 |
| | Lake Jackson (Osceola County) | 2006 |
| | Lake Rosalie (Polk County) | 2006 |
| | Lake Pierce (Polk County) | 2006 |
| | Lake Marian (Osceola County) | 2006 |
| | Fish Lake (Osceola County) | 2008 |
| | Lake Butler Chain of Lakes (Orange County) | |
| | Ground Water: | --- |
| | Kissimmee Basin Floridan Aquifer | |

# Biscayne Bay Minimum Flows and Levels

## *Legal and Policy Background*

# Minimum Flows and Levels

- Point at which further withdrawals cause "significant harm" to water resources or ecology of the area
- Water resources functions include fish and wildlife, freshwater storage and supply, and water quality protection
- May provide for non-consumptive uses, including recreation & navigation
- Based on best available information
- Periodically evaluated and updated, as needed

# MFL Establishment Considerations & Exclusions

- Shall consider changes and structural alterations to hydrology
- Shall consider constraints imposed by changes and structural alterations on hydrology
- Determine whether significant harm caused by withdrawals
- May determine that setting MFL based on historical condition is not appropriate
  - Technical feasibility?
  - Economic feasibility?
  - Cause adverse environmental or hydrologic impacts?

# Minimum Flows and Levels Recovery and Prevention Strategy

- Prevent falling below MFL
- Achieve recovery of MFL "as soon as practicable“
- Phased strategy to provide for existing and projected reasonable-beneficial uses
- Integrate into regional water supply plans

# Examples of Recovery and Prevention Strategies

- Water resource and water supply development (freshwater storage, conveyance enhancements, alternative water supply, conservation)
- Regulation/Water Shortage
  - Consumptive Use Permit Conditions
  - Water Shortage Triggers
- Operations
- Resource monitoring and research

# Rulemaking Process

- Rule Development
- Scientific Peer Review
- Notice of Rulemaking
  - Point of Entry for Challenge
- Comment Period/JAPC Review
- Public Adoption Hearing (Governing Board)
- File Rule with State

# MFL Development Process

- Identify appropriate water resource functions
- Identify key harm indicators
- Identify baseline conditions of water resources - “considerations & exclusions”
- Identify technical relationship between water resource impacts & changing hydrologic conditions
- Identify point at which significant harm occurs due to changing hydrologic conditions

# Water Supply and Resource Protection Tools in Chapter 373

- Consumptive use permitting-harm
- Minimum flows and levels
  - significant harm
- Water shortage-serious harm
- Water reservations-protection of fish and wildlife

# “Harm” Definition

- Temporary loss of water resource functions  that takes a period of one to two years of average rainfall conditions to recover
- Results from change in surface or groundwater hydrology
- Defined in consumptive use permit rules

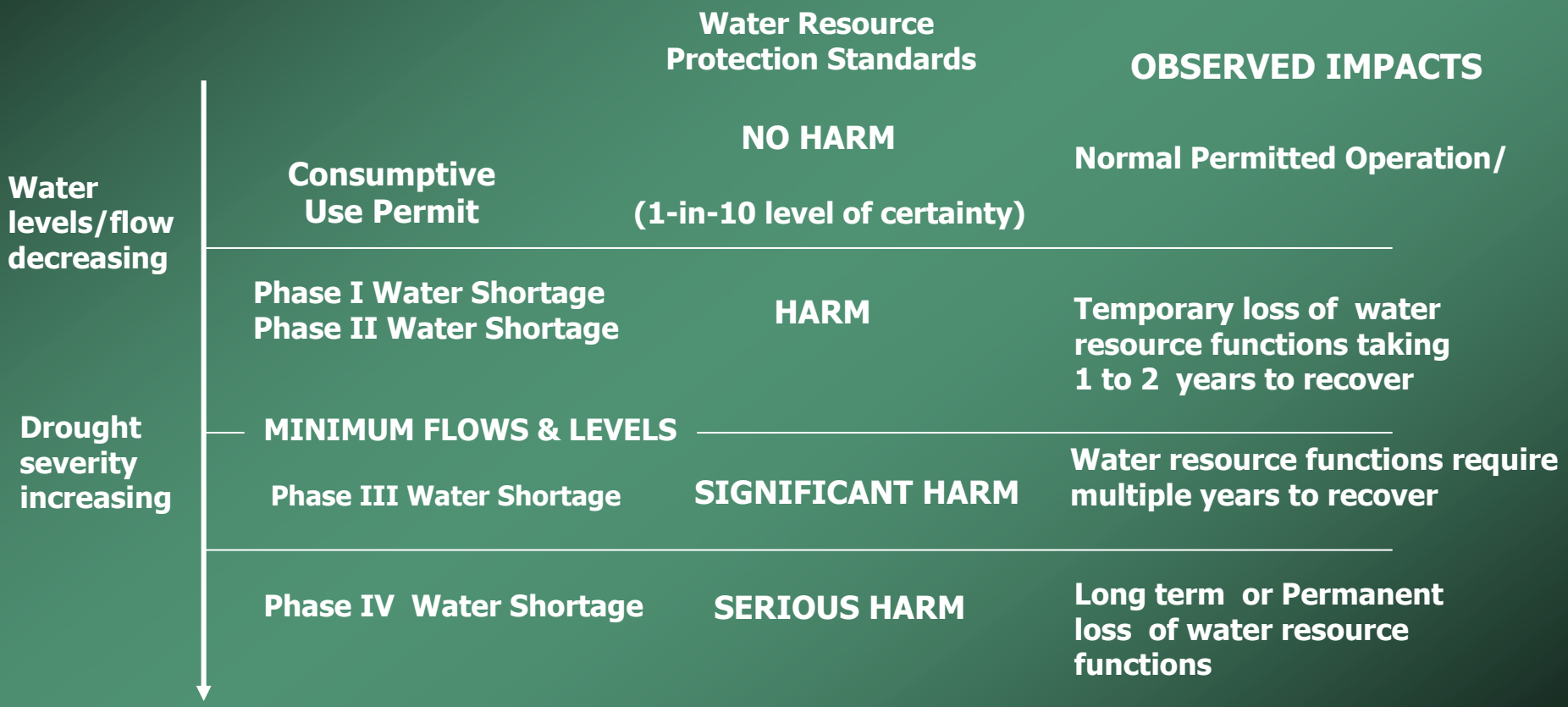
# “Significant Harm” Definition

- A loss of specific water resource functions that takes multiple years to recover
- Results from a change in surface water or ground water hydrology
- Defined in Chapter 40E-8, with linkage to water use permit and water shortage rules

# “Serious Harm” Definition

- Long-term loss of water resource functions
- Resulting from a change in surfce or ground water hydrology
- Addressed in Water Shortage Plan

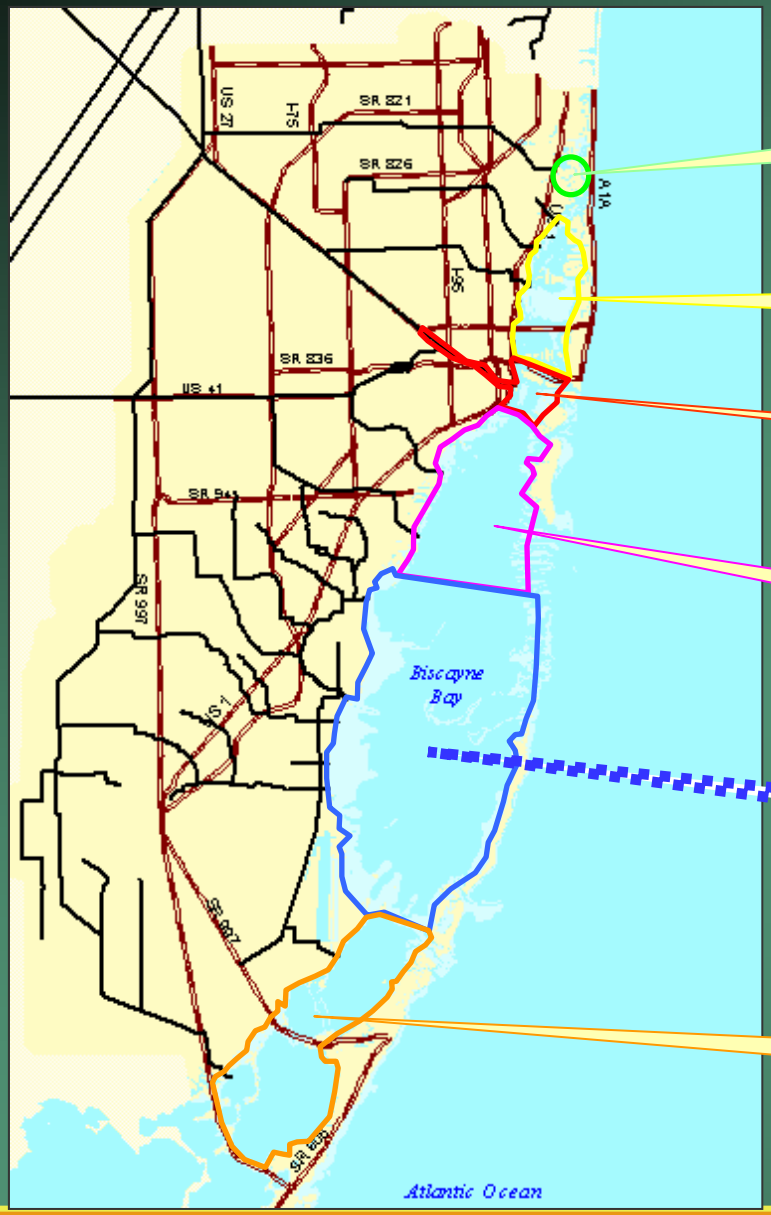
# Figure 1: Conceptual Relationship Among the Harm, Serious Harm and Significant Harm Standards



# Biscayne Bay
# Minimum Flows and Levels

## *Resource Functions*

# Regions of Biscayne Bay




Snake Creek/Oleta River

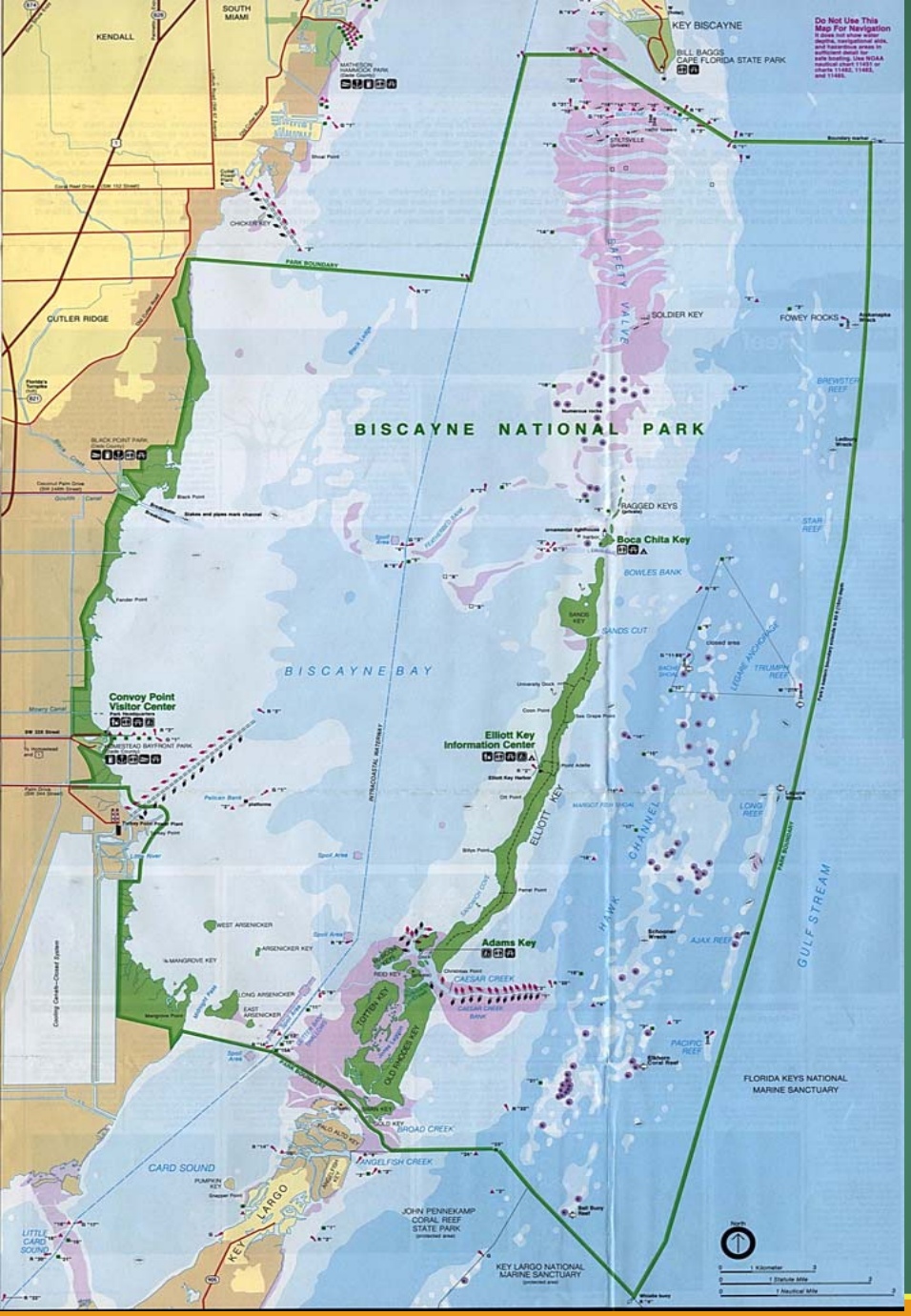
North

Miami River

North Central

South Central

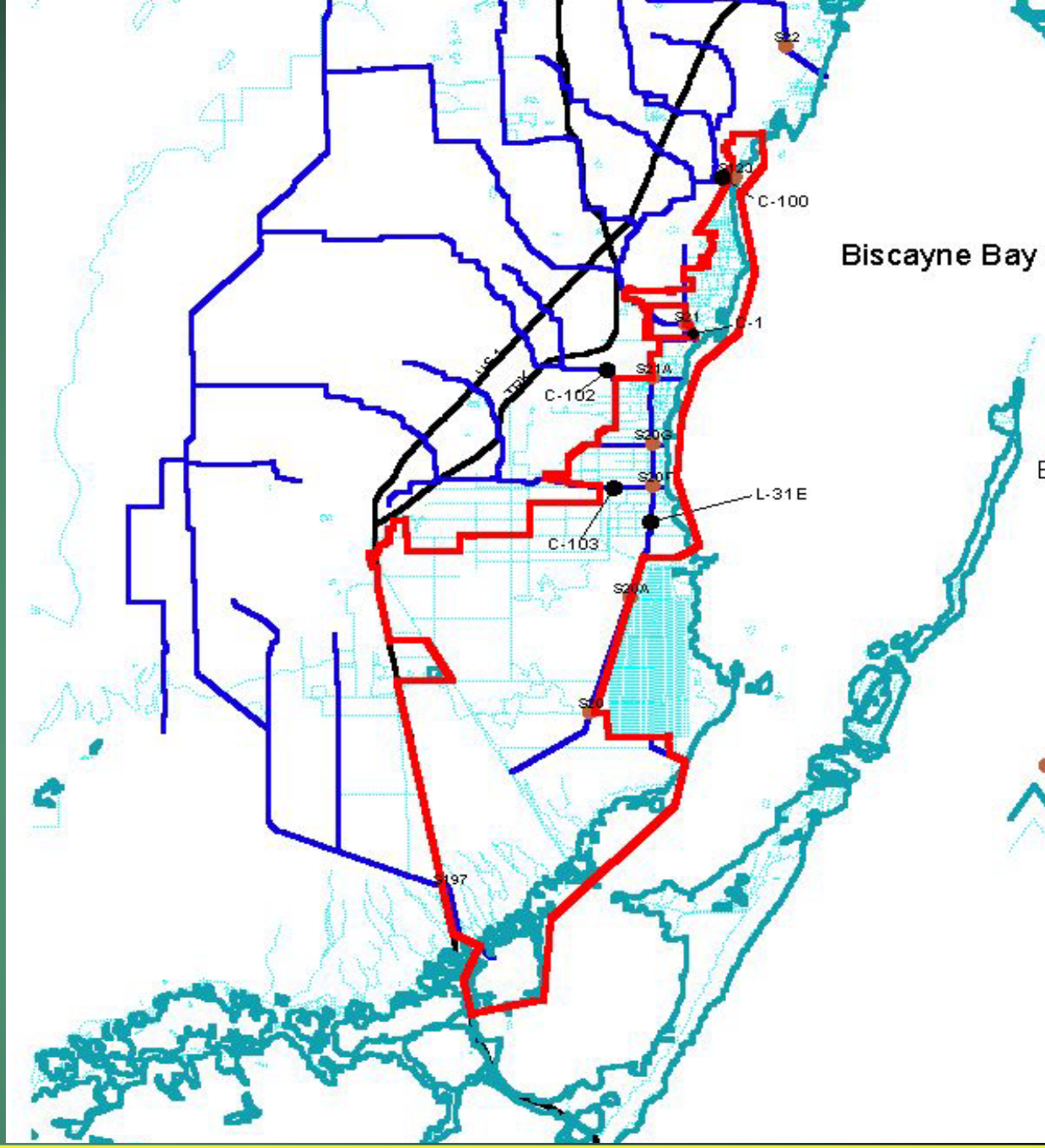
South



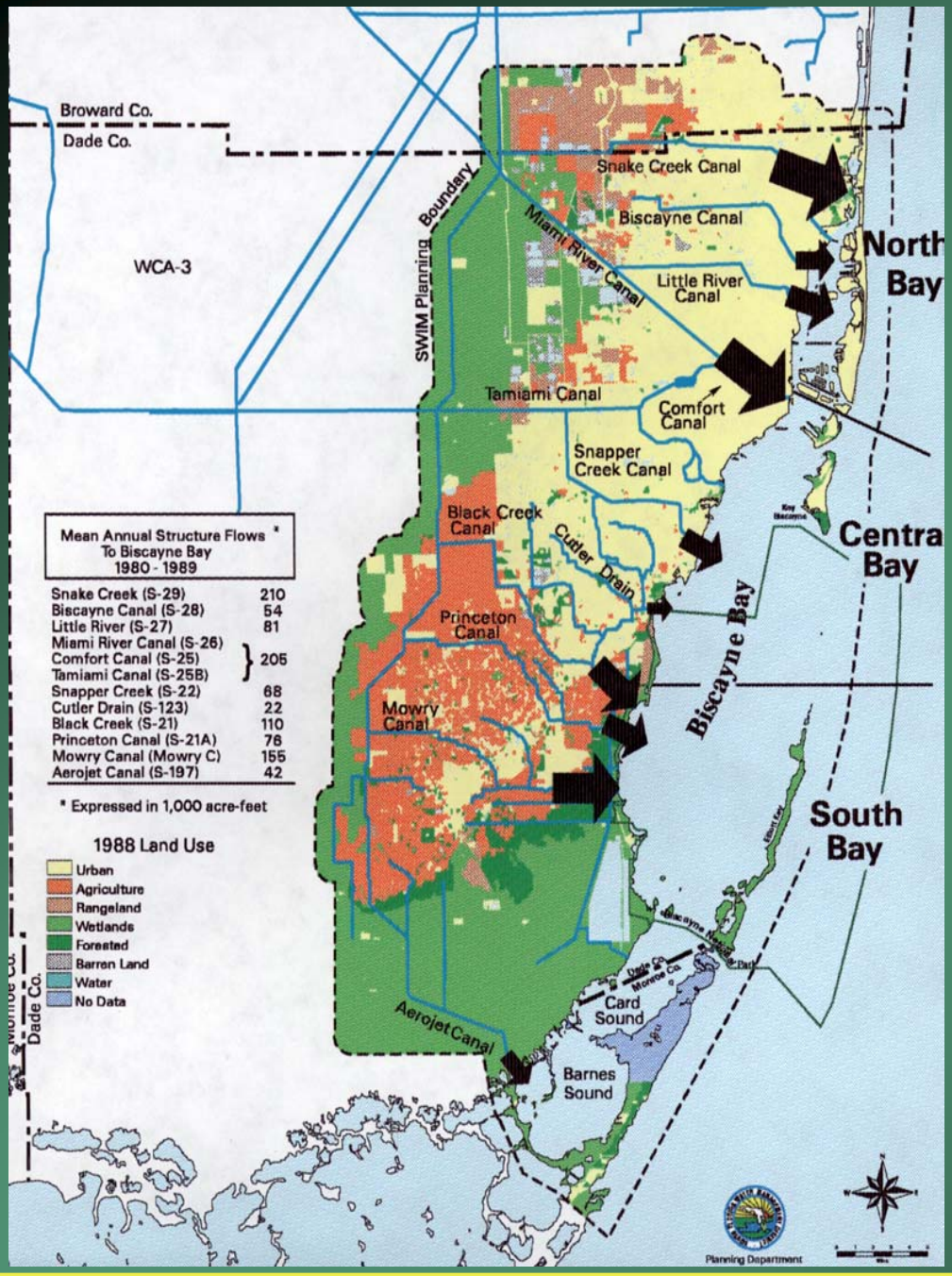

# Biscayne National Park

- Largest marine park
- Unique resources
- 500,000+ visitors/year

# Biscayne Bay Coastal Wetlands Project



# Watershed Considerations




- Flood control
- Water supply
- Water quality

# Biscayne Bay Minimum Flows and Levels

## Technical Discussion Group

# Technical Discussion Group - Views on Bay Freshwater Management

- Salinity variations affect multiple species of flora and fauna
- Salinity variations stress Bay fauna
- Salinity variations have contributed to the loss of near-shore mesohaline (salinity is 5-18 ppt) habitat

# Technical Discussion Group - Recommendation

- Protect existing near-shore salinity until restoration of mesohaline zone can be accomplished

- (restoration = increased production of pink shrimp, grey snapper, snook, redfish and seatrout)

# Review and Analysis of Existing Available Data and Literature

# Review and Analysis of Existing Available Data and Literature - Documentation

- Freshwater Flow and Ecological Relationships in Biscayne Bay
- Seagrasses, Associated Fauna and Faunal Habitat Requirements Documentation and Analysis

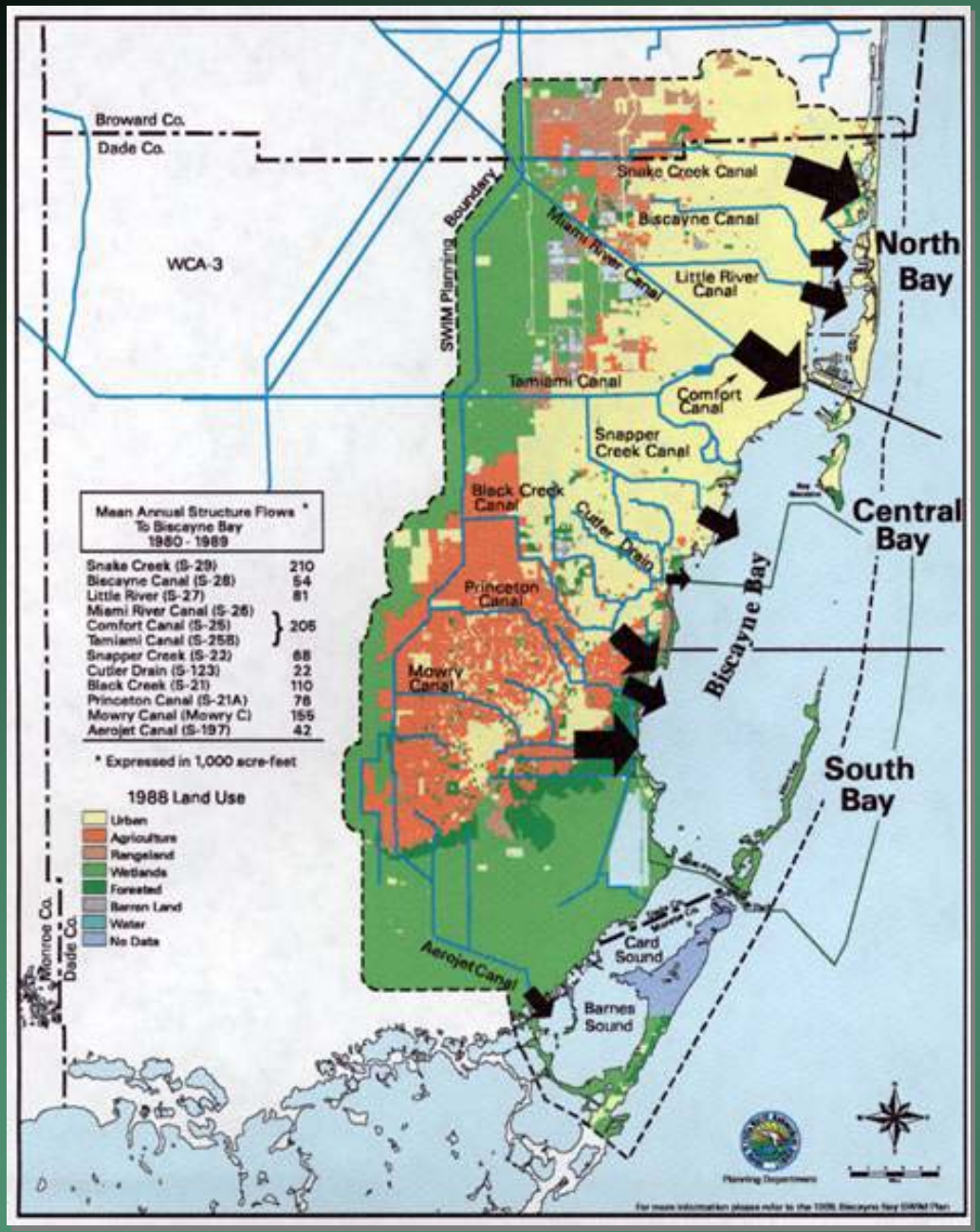
# Existing Available Data and Literature

**Documents are located at:**

http://www.sfwmd.gov/org/wsd/mfl/biscaynebay/project_doc.htm

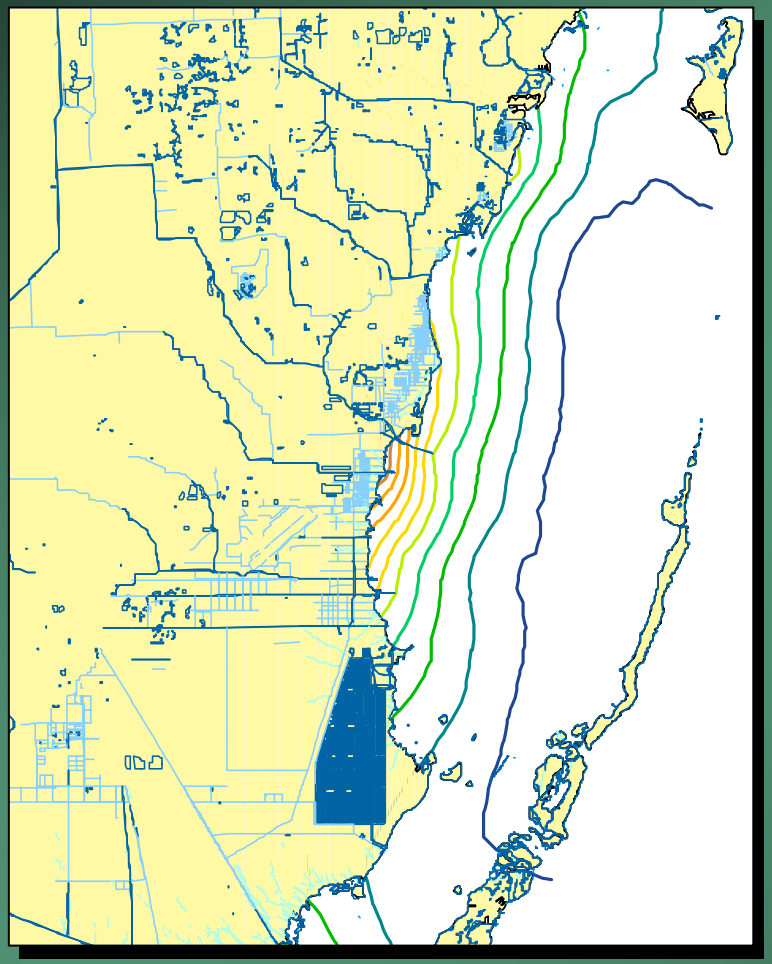
# Biscayne Bay
# Minimum Flows and Levels

## *Proposed Salinity/Habitat Indicator*

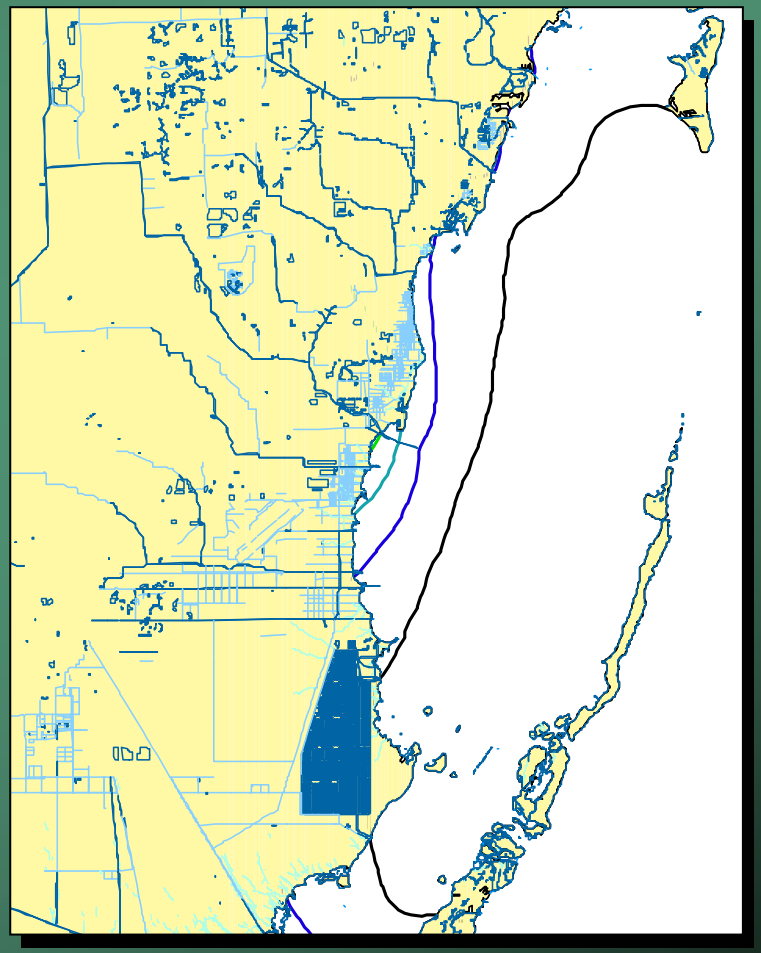



**Freshwater flows into and strongly affects the western parts of Biscayne Bay**

## September Isohalines (15-35 ppt)



## May Isohalines (30-37 ppt)



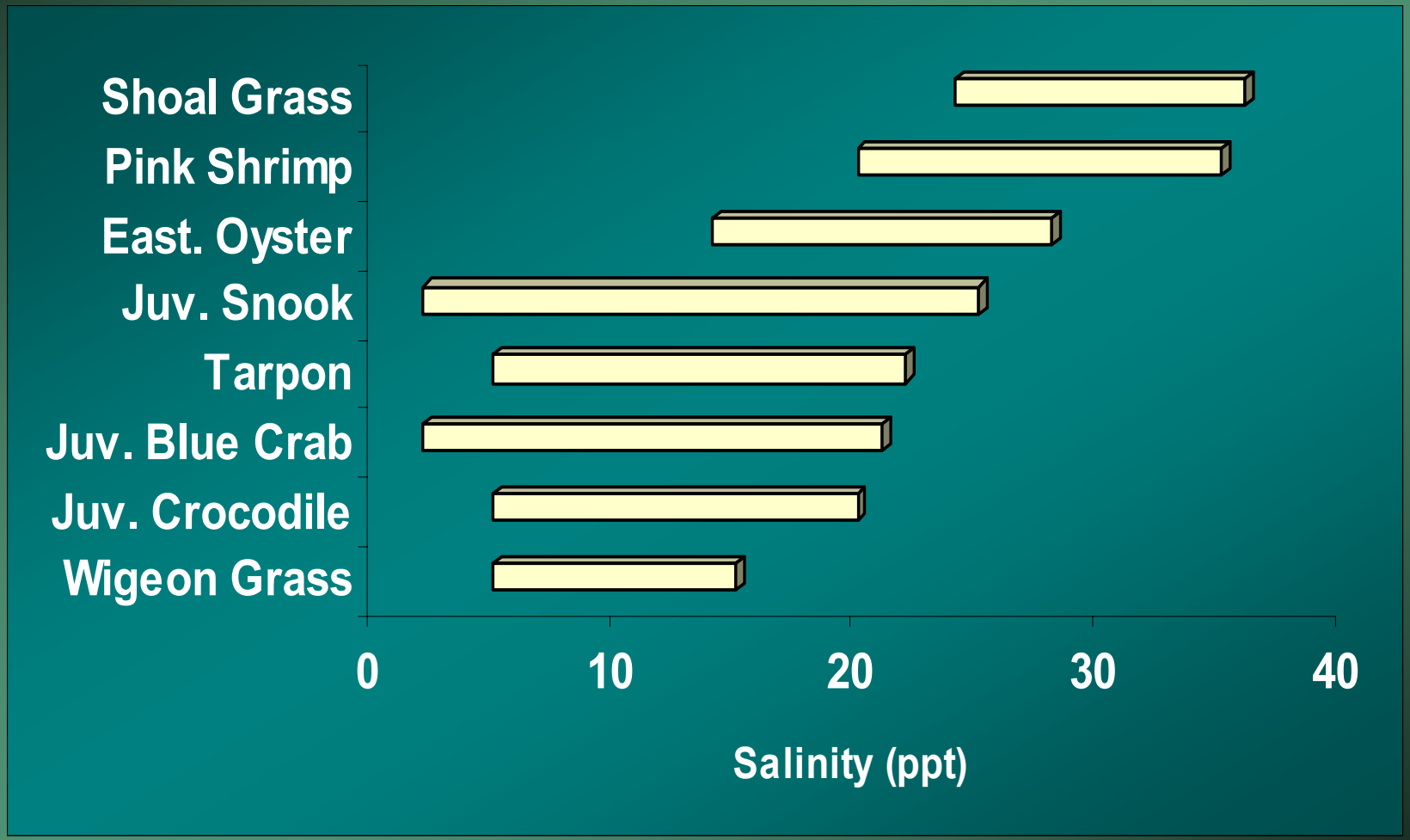
| Short List of Indicator Species | |
|---|---|
| Scientific Name | Common Name |
| *Halodule wrightii* | Shoal grass |
| *Ruppia maritima* | Wigeon grass |
| *Callinectes sapidus* | Blue crab |
| *Centropomus undecimalis* | Common snook |
| *Crassostrea virginica* | American oyster |
| *Crocodylus acutus* | American crocodile |
| *Farfantepenaeus duorarum* | Pink shrimp |
| *Megalops atlanticus* | Tarpon |

- **42 + potential species identified**
- **8 somewhat abundant**

## Filtering criteria:

- **Reside in Biscayne Bay**
- **Dependent on freshwater input**
- **Sufficiently Documented**

# Approximate Salinity Preference Ranges



# Valued Ecosystem Component (VEC)

- Element of biological community
- Important to local human population or national profile
- Of scientific concern
- Important for evaluation

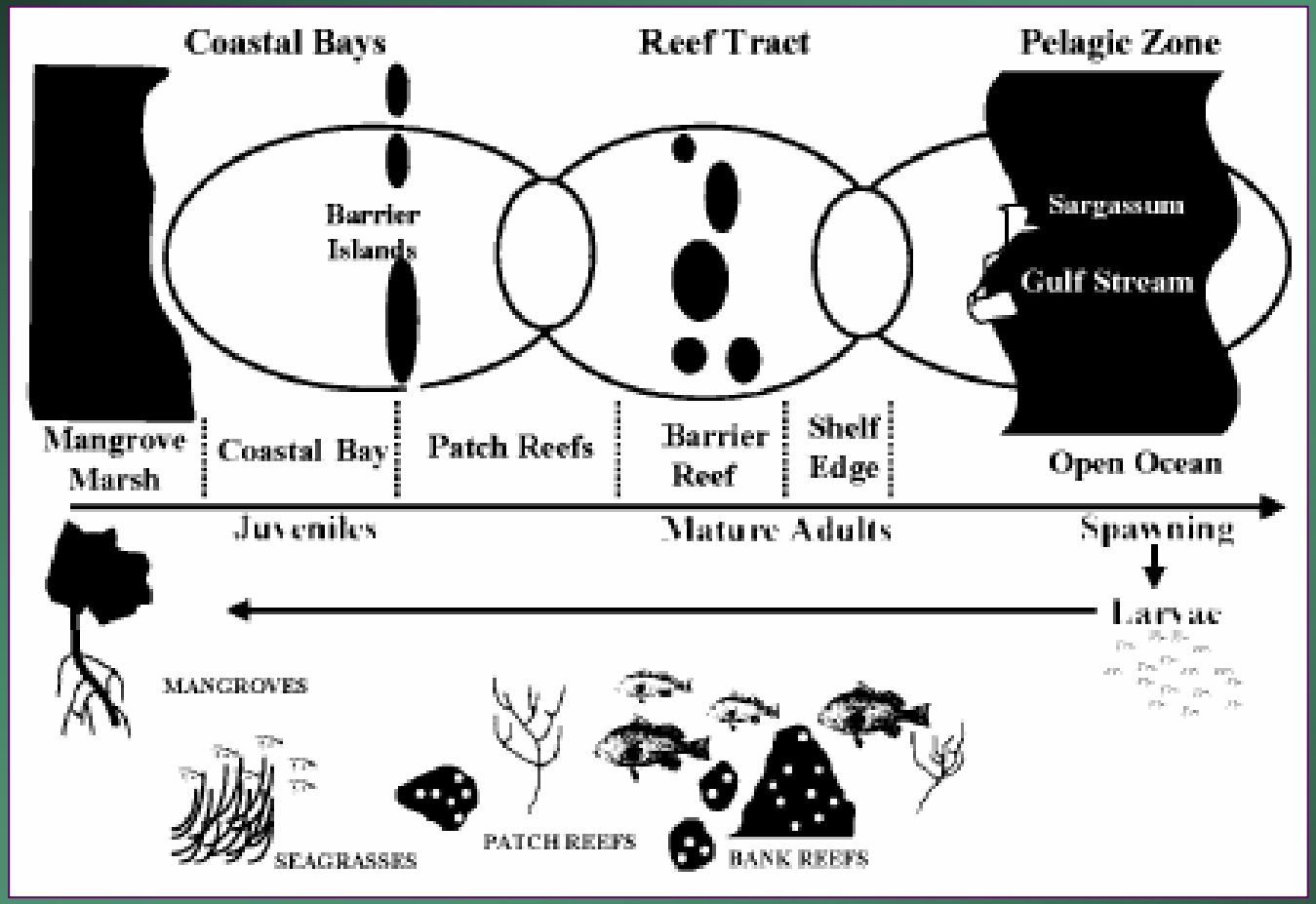
# VEC Assumptions for MFL

- Health should be strongly tied to salinity
- What's good for the VEC is good for the Bay's ecosystem
- Should be relatively easy to monitor status
- Loss indicates significant ecological changes

# Biodiversity Benefits

- Maintains ecosystem processes
- Enhances resilience
- Affects society

# Habitat Diversity Linkages




- Ault et al. 2001; NOAA
- Critical linkage to near-shore

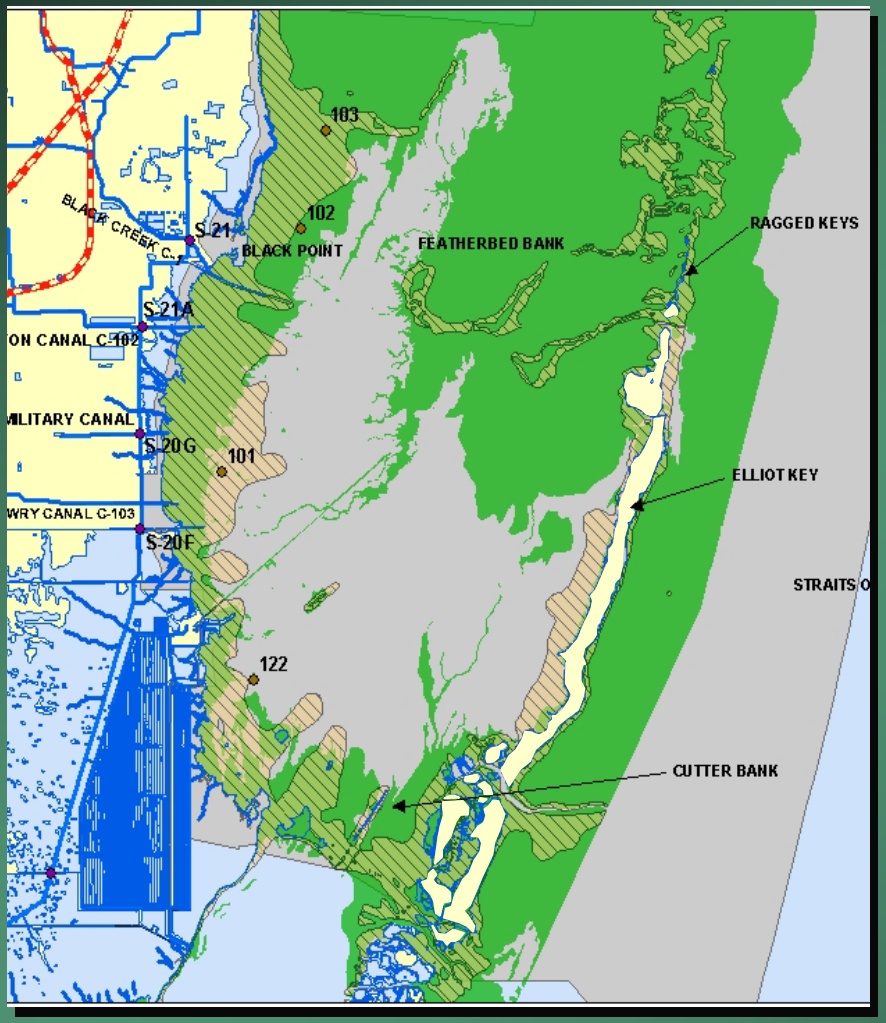
# Faunal Preferences

- Species on short list prefer low to moderate salinity
- Juvenile pink shrimp found closer to shore in mixed grass/shoal grass
- Amphipods prefer shoal grass
- Copepods more diverse in shoal grass

# VEC Selection

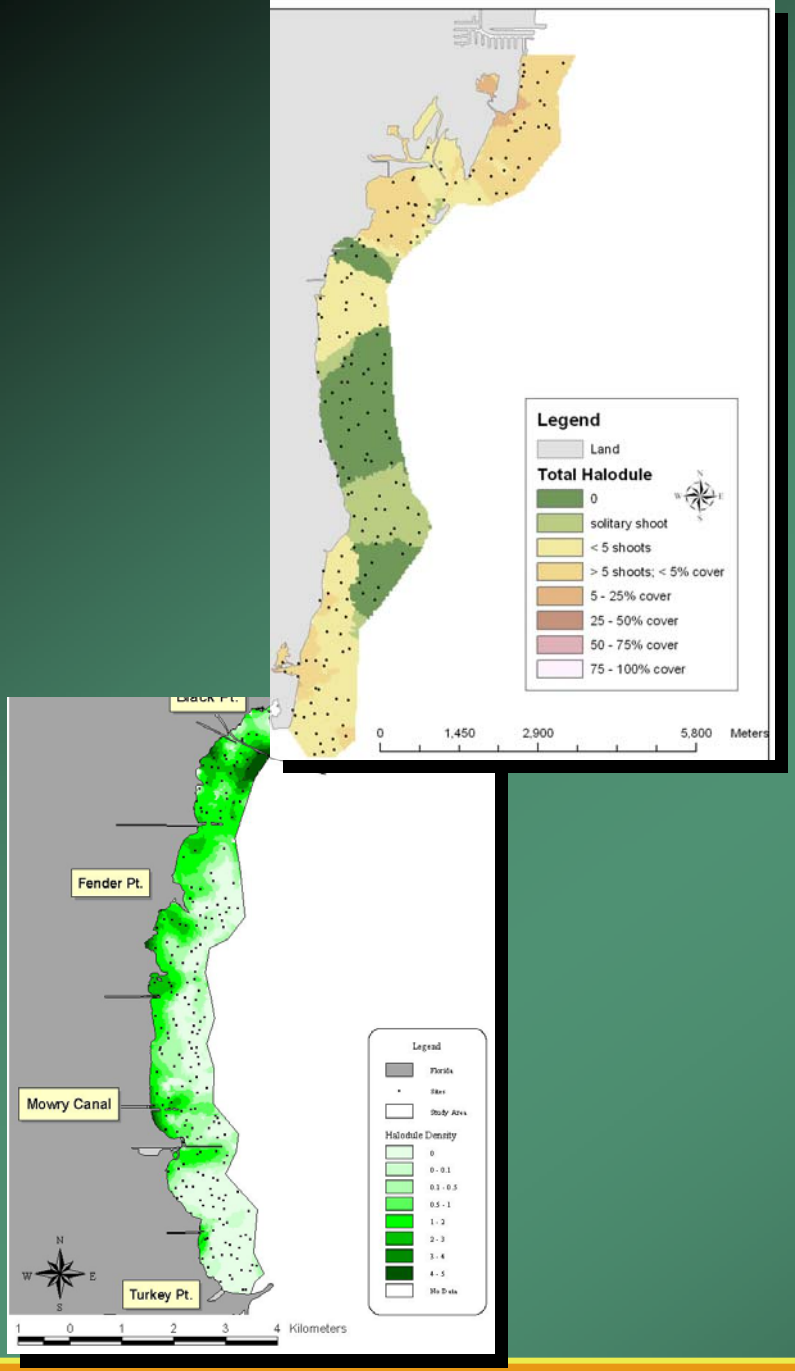
| Species | Monitoring Ease | Abundance, Importance | Affect on Population |
|---|---|---|---|
| Shoal grass | ✓ | ✓ | ✓ |
| Wigeon grass | ✓ | | ✓ |
| Blue crab | | | ✓ |
| Common snook | | | ✓ |
| American oyster | ✓ | | ✓ |
| American crocodile | ✓ | | |
| Pink shrimp | | ✓ | |
| Tarpon | | | ✓ |

# Seagrass abundant in SC Bay



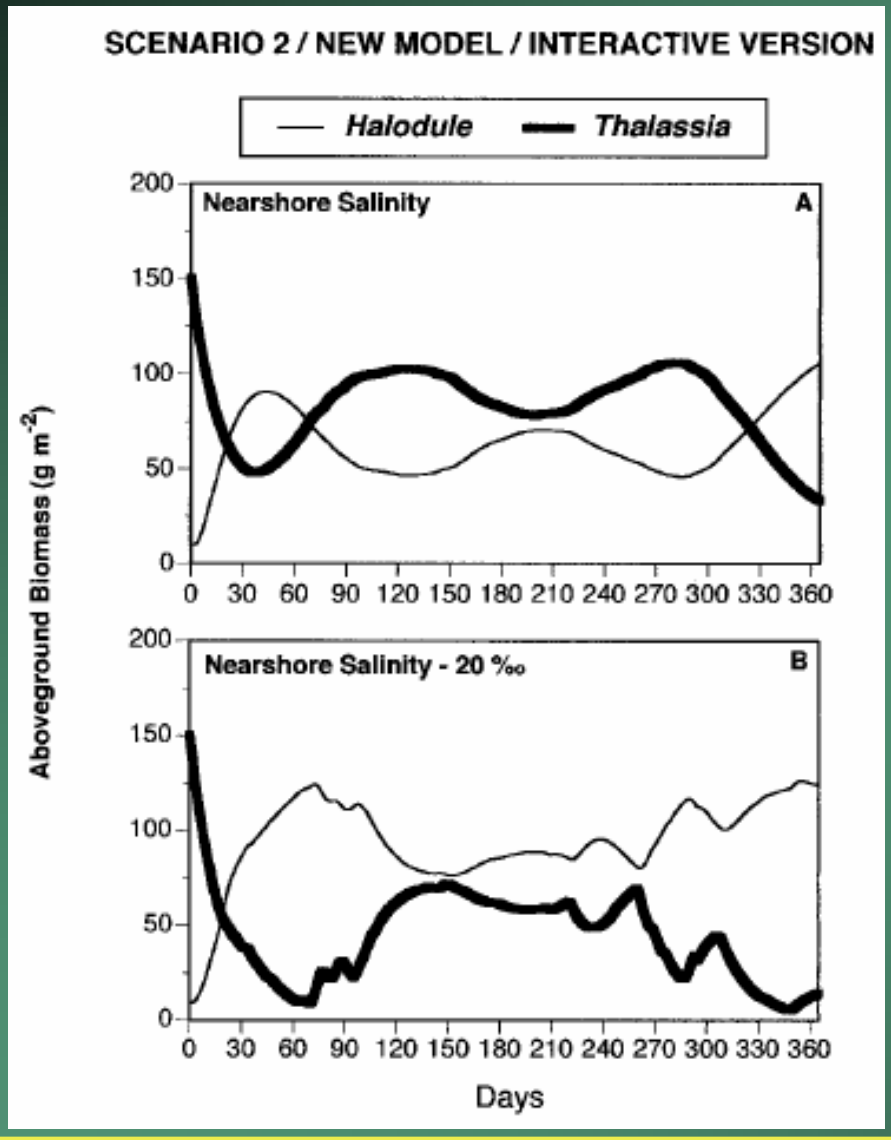

- 80-90% turtle grass
- 10-20% shoal, manatee & wigeon grasses

# Shoal grass



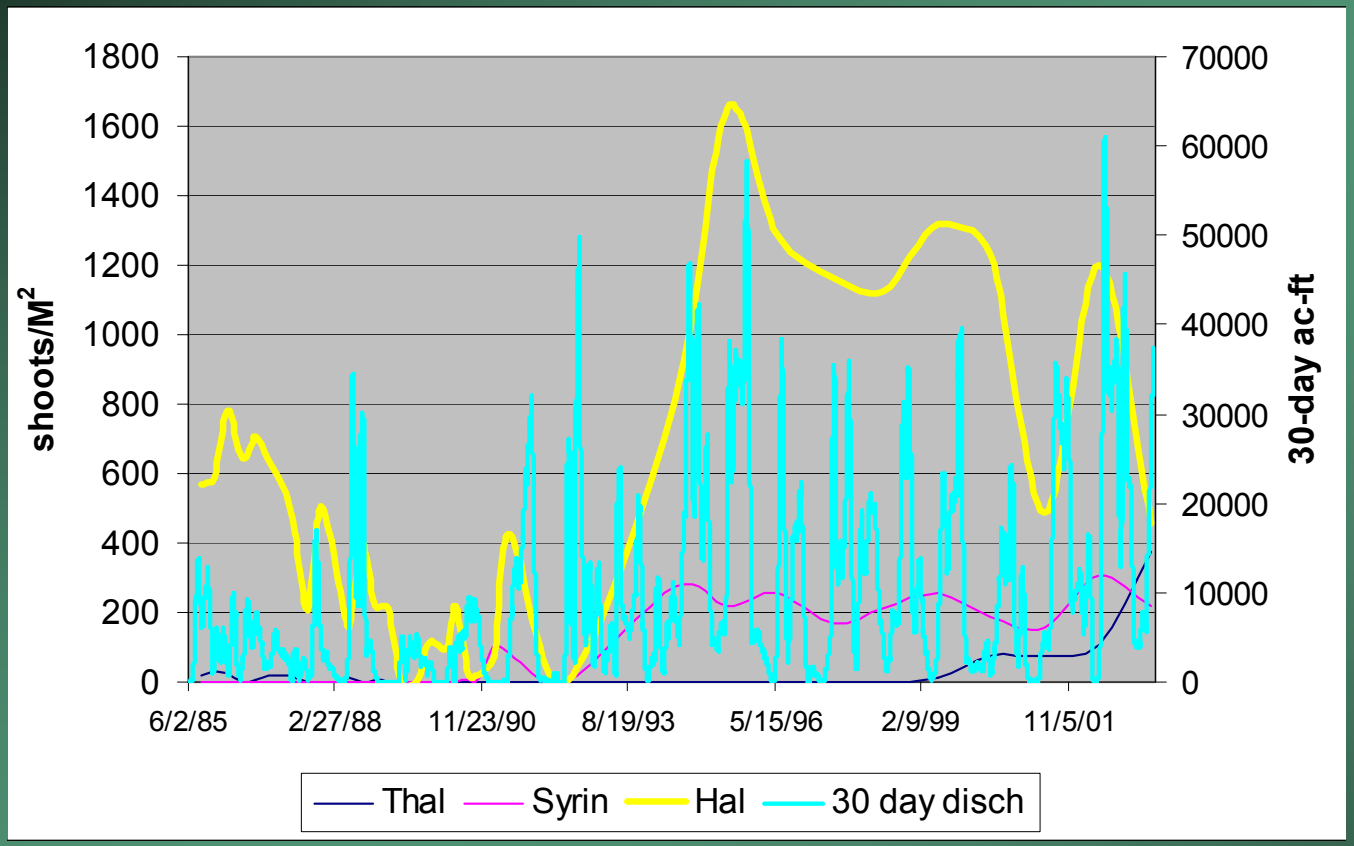

- Mapped within 1 km of shore
- Most abundant nearby freshwater output

# Shoal grass response in study area




- Lirman & Cropper (2003) models
- Shoal grass productivity increases with decreased salinity
- Competes better

# Shoal grass response at Black Point




- M-D data collected nearshore
- Shoal grass cover associated with canal flows (C-1)

# MFL Recommendations for South Central Biscayne Bay

- Maintain salinity gradient
- Use shoal grass as primary VEC
- Use 7 other species as secondary indicators